REMARKS

Favorable consideration and allowance are respectfully requested for claims 4-7 and 8-20 in view of the foregoing amendments and the following remarks.

The Examiner is thanked for the courtesies extended during the personal interview held January 19, 2005, the substance of which is reflected herein.

Claims 1, 2, 4, 8 and 18 are cancelled by this amendment. Claim 3 was previously cancelled. These claims are cancelled without prejudice and without any disclaimer of the subject matter therein. The substance of these claims is being pursued in a divisional application.

Claims 5, 6 and 9-16 are amended to make them dependent from either claims 19 or 20. These amendments merely change the dependency of these dependent claims and does not introduce any new matter. The amendments make claims 19 and 20 the only independent claims in this case. These claims correspond to previously-pending claims 1 and 2, the difference being that claims 19 and 20 recite the transitional phrase "consisting essentially of." Because claims 19 and 20 are nearly identical to previously-pending claims 1 and 2, making all of the claims dependent from either claim 19 or 20 rather than claims 1 and 2 does not present any new issues for consideration and prompt entry of these amendments is respectfully requested.

The rejection of claims 1, 2 and 4-20 under 35 U.S.C. § 103(a) as obvious over Bornstein et al. (PCT doc. no. WO 93/24683) is respectfully traversed.

As indicated in the recent Office Action, Bornstein does not teach the specific proportions recited in the claims. See page 2 of the November 1, 2004 Office Action. In particular, the reference does not teach the claim limitation that the "weight ratio of tungsten to rhenium is 1.1 to 1.6" in the alloy. Nevertheless, the Office Action asserts that the claimed invention is obvious

because the alloy proportions taught by Bornstein overlap the instantly claimed proportions.

While there is precedent for the proposition that the discovery of an optimum value within known percentages may be obvious, the law is clear that this only applies to variables which are known to be result-effective. See *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). The MPEP, at section 2144.05 II(B), has characterized this case as follows:

> A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.

Thus, where the prior art did not recognize the parameter optimized as a result-effective variable, the claims were not obvious. See *In re Antonie*. In the case of *In re Antonie*, the court explained that optimizing a variable within a known percentage range is not obvious where (i) the result of optimizing a variable achieves some unexpectedly good result or (ii) where the optimized variable was not known to be result-effective. See 195 USPQ at 8 and 9.

Part (ii) of this rule is directly applicable to the present case. The cited reference provides one of skill in the art with no motivation to try to modify the ratio of tungsten to rhenium as is necessary in order to arrive at the presently-claimed invention. The reference itself is directed to oxidation resistant superalloy castings. These oxidation resistant alloys are created using a magnesium-bearing ceramic material in the casting mold. During casting, while molten metal solidifies within the mold, magnesium from the mold combines with the molten metal alloy in the mold.

There is nothing in the reference that teaches that any properties of the alloy may be improved upon or even adjusted based on the ratio of tungsten to rhenium in the alloy. The reference does not contemplate such a ratio or even to try to adjust the amounts of the listed elements (other than Mg) so as to modify the characteristics of the alloy. Even assuming one were to try to modify the amounts of the other elements, with 12 possible elements to try to combine, one of skill in the art would have to figure out which elements to try to modify, how many to try to modify, and whether to try to add any new elements or subtract any listed elements. The number of potential combinations is virtually unlimited.

The present record provides no explanation of how one of skill in the art could take Bornstein and realize that the ratio of tungsten to rhenium in the alloy might be of any significance. Reviewing the reference, there is nothing to provide one of skill in the art any motivation or suggestion to try to modify characteristics such as density, strength, thermal stability, the heat treatment window, or the melting diffusion zone characteristics. Bornstein focuses on how to properly incorporate magnesium into alloys and merely recites ranges for twelve ingredients that may be used in the alloy. Accordingly, reviewing Bornstein, one of skill in the art would not realize the importance of the tungsten to rhenium ratio in the alloy.

In a preferred composition of Bornstein, the potential range of rhenium is from 0 to 4.2 weight percent, see page 5. At a weight percent of 0, there is no rhenium in the alloy, and accordingly, there can be no ratio of tungsten to rhenium. In this sense, the reference actually teaches that rhenium is not required in the alloy. Because the reference teaches that rhenium is not required, one of skill, upon reviewing the reference, would consider rhenium unimportant. Thus, the reference certainly does not teach the importance of having rhenium and tungsten together in certain proportions.

During the interview of January 19, 2005, Applicant's attorney expressed his disagreement with the proposition that in order to fall within the nonobviousness considerations outlined in *In re Antonie*, the Applicant must prove that the parameters of interest are not known to be result effective variables. The law requires the Patent Office to show that a claimed invention is obvious and accordingly, the Patent Office bears the burden of presenting a complete obviousness case. As explained in the MPEP, § 706.02(j), the Patent Office bears the burden of presenting a *prima facie* case of obviousness. This canon of patent prosecution should be changed where part of that *prima facie* case involves a prior art reference with ranges that overlap the claimed ranges. The present record includes no authority or other indication of why obviousness should be presumed, and the Applicant should be required to rebut that presumption.

The *In re Antonie* case follows this logic. That case involved the patentability of claims to a wastewater treatment device that recited a particular ratio of tank volume to contractor (surface) area. The court expressly rejected the Examiner's assumption that the reference taught the idea of increasing the ratio of tank volume to surface area to increase efficiency. Rather, the court pointed out that it would have been impossible to recognize, from the reference, that "treatment capacity" is a function of "tank volume" or the tank volume-to-contractor area ratio. Further, the court noted that this functionality can only be recognized from data represented by experiments where the variables of interest are changed and that this type of experiment was not suggested by the teachings of the reference, since the reference was not directed to the parameter in question, "treatment capacity." Thus, the court determined that because the *reference* did not teach that parameter optimized was a result-effective variable, the claims were not obvious.

Similarly, Bornstein is not directed toward achieving a lower density, higher strength alloy, or an alloy with improved thermal stability, heat

treatment window, or melting diffusion zone characteristics. The reference does not teach or suggest a way to control these parameters. No experiments or test results are suggested that would enable one of skill in the art to change these parameters. Accordingly, the Bornstein reference provides no suggestion or motivation to a person of skill in the art to try to vary these parameters, much less any motivation to try to make any changes by altering the ratio of tungsten to rhenium. Thus, like the case of *In re Antonie*, the Bornstein reference does not teach that altering the ratio of tungsten to rhenium may be result-effective, and therefore the obviousness rejection cannot be properly maintained. Reconsideration and withdrawal thereof are respectfully requested.

As discussed during the interview, claims 19 and 20 are believed to be patentable over Bornstein because the Bornstein alloys require the presence of Mg or Ca, whereas claims 19 and 20 are directed to an alloy that does not contain Mg or Ca. Each claim recites the transitional phrase "consisting essentially of" which limits the claim to the specified materials and those that do not materially affect the characteristics of the claimed invention.

One feature of the inventive alloys is that they are easy to cast, see paragraph [0012] of the specification. Bornstein is directed toward oxidation resistant alloys, and Bornstein teaches that specialized casting methods are required to make these alloys. The requirement of specialized casting methods makes the Bornstein alloys dissimilar to the presently-claimed alloys.

Bornstein's alloys are described generically on page 2, line 15, as relating to the discovery that alloys with small amounts of Mg have excellent oxidation resistance. The specification then continues to describe these Mg-containing alloys and ways of making them until the end the specification, page 6. There, Bornstein states that Ca may be substituted for Mg in the alloys. The reference does not indicate whether the specialized casting techniques, described in the preceding pages, must be used when Ca is substituted. Similarly, the reference

does not indicate the degree of similarity between the Ca containing alloys and their Mg containing counterparts. There is, however, no suggestion that the specialized casting techniques may be avoided when Ca is used. Presumably, if the special casting techniques required for the introduction of Mg could be made unnecessary by substituting Ca, the entire discussion of the specialized casting techniques and the properties of the Mg containing alloys (see Figure 2) and the entire specification preceding the last page become largely superfluous. This is because no person of skill in the art would elect to perform the specialized casting techniques if they could simply use Ca instead of Mg and avoid the expense and time associated with the specialized casting techniques. Presumably, if the use of Ca avoided the need for the specialized casting techniques, then Bornstein would have said so.

Further, by indicating that Ca may be substituted for Mg, Bornstein indicates that Ca is the substantial equivalent of Mg. See page 6 of Bornstein. The term "substitute" means a person or thing that takes or can take the place of another. See the American Heritage College Dictionary, 3rd edition. Accordingly, reviewing the reference, one of skill in the art would have no reason to believe that by providing a substitute for Mg, one could avoid the need for specialized casting techniques. There is no indication that the specialized casting techniques are unique to Mg or that Mg and Ca are in some way dissimilar so as to avoid the need for specialized casting techniques when Ca is used.

The penultimate paragraph of the specification indicates that the desired Mg-containing alloy may be made by adding Mg to the master melt, rather than using the specialized casting techniques outlined in the reference. However, this paragraph also states that the casting process must be modified to prevent excessive loss of Mg. There is no indication of whether Ca might or might not be used in this modified casting process. Even if there were, the reference provides no indication that by substituting Ca for Mg, the modification to the casting

process is unnecessary. Thus, this casting process requires some extra steps or techniques to avoid excessive loss of Mg and is therefore also specialized. It is noteworthy that the reference does not teach what modifications are necessary in order to avoid excessive loss of magnesium. Instead, Bornstein merely states that "the casting process needs to be modified." Thus, the reference provides no direction as to how one is to avoid the excessive loss of magnesium, unless one uses the specialized casting technique outline in the earlier pages of the specification.

One of skill in the art would understand from Bornstein that the addition of Mg or Ca to the alloy make the specialized casting techniques a requirement. This requirement amounts to a material change in the basic and novel characteristics of the claimed invention, because the claimed invention is directed to alloys that do not require specialized casting. Claims 19 and 20 recite the transitional phrase "consisting essentially of" and preclude the addition of anything that would materially change the characteristics of the claimed invention. This language precludes the addition of Mg or Ca to the alloy as is required by Bornstein. Accordingly, claims 19 and 20 are allowable over Bornstein. Claims 4-7 and 8-18 all depend from, directly or indirectly, either claim 19 or 20, and include all of the limitations of thereof and are therefore similarly allowable. Reconsideration and withdrawal of the rejection of these claims are respectfully requested.

Although the claims are believed to be patentable in view of the foregoing remarks even without a showing of unexpected results, Applicants submit that on the present record, a proper showing of unexpected results has been made by the Declaration of Dr. Thomas Mack. The declaration shows that the claimed invention provides alloys having high thermal stability, an improved heat treatment window, the absence of a low melting diffusion zone during coating and improved strength characteristics, when compared with alloys outside the claimed ranges and ratios.

CONCLUSION

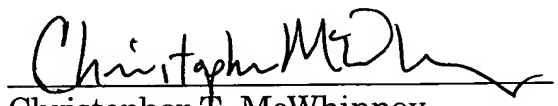
In view of the foregoing, the application is respectfully submitted to be in condition for allowance, and prompt, favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

Although a petition for an Extension of Time was previously submitted, if necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #011235.50807US).

Respectfully submitted,

April 1, 2005



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